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b) intersecting said object beam with a reference coherent beam in a recording medium to form an interference pattern or hologram thereof that can correct for defects in said objective.

REMARKS

Claims 1 - 39 are in the present application. Such claims have been amended as indicated, to meet certain objections of the Office Action and for clarity and no new matter has been added.

The Office Action rejection of claims 1, 2 - 14, 15 - 17, 18, 19, 20, 21 - 31, 32 - 36, 37, 38 and 39 as indefinite under 35 U.S.C. 112, second paragraph, is respectfully traversed. As indicated above, many of these claims have been amended for clarity. For example the question of coherency of the object beam and reference beam has been attended to, e.g., in claim 2 by designating the object beam as a first laser beam which is intersected by a reference coherent beam, which makes clear that these two beams are coherent with each other.

The phrase "in a microscope" was questioned relative to claims 9, 10, 11, 27 and 28 and these claims have been cancelled as repetitive.

As for claim 12, it is intended that the pinhole be replaced by a first spatial filter as it says.

Also certain phrases in the claims such as "a long distance microscope" have been removed to limit the issues.

As for lack of antecedent basis in claims 18 and 37 for "the article", such basis is provided in paragraph "d)" of both claims as "the article to be viewed", which is believed sufficient.

In claim 19, a corrective hologram maker for a microscope means a device for making a hologram to correct for the objective of a microscope as recited.

In claim 33, certain objected-to language has been removed as indicated.

Similarly claim 36 has been amended to point out that an additional interference pattern of light and dark fringes is provided by this inventive method. This is the new interference pattern suggested by the Office Action.

Thus it is believed that Applicant's above claims have been sufficiently clarified to point out Applicant's inventive embodiments.

The Office Action rejection of claims 1, 2 - 14, 15 - 17, 18, 19, 20, 21 - 31, 32 - 36, 37, 38 and 39, as obvious under 35 U.S.C. 103 over the Schock et al Article in view of the Friedl patent '466, is respectfully traversed. The Schock apparatus employs a pair of laser beams to write a hologram, not for a lens but for window glass, that instead of receiving an image through the hologram from an object behind the glass, sends a beam through the hologram in the opposite direction. Also there is no provision for placing an object behind the window glass and illuminating it for corrected viewing.

That is, Schock corrects for window glass not a lens and sends light the wrong way through hologram and glass. Even if he were to place an object behind such window glass and illuminate it for sending an image in the right direction, i.e., back through the hologram, such window glass would only provide a blurred image, not a focused image such as can be provided by an objective.

Now Friedl writes a holographic plate to correct for a telescope lens but it is a stretch to say that the Friedl lens should replace Schock's plexi-glass cylinder, which is needed to contain fluid flow therein. Inserting such lens into the Schock cyclinder would impede the flow and data collection thereof.

It is well settled that references will not be combined to destroy or impair the function of reference.

That is, the Office Action seeks to a) replace Schock's plexi-glass cylinder which contains fluid flow with a lens which would hinder fluid flow, b) change the direction of the Schock beam in Figure 7, 180° and c) place an object to be viewed in such plexi-glass cylinder, all in an attempt to reconstruct Applicant's invention.

That is, one has to make too many changes to Schock in replacing a plexi-glass cylinder with a lens, reversing the beam of Figure 7 and placing an object behind a lens which a) destroys Schock's intended function of monitoring fluid flow and goes against Friedl's intended function of a telescope, in attempting to arrive at Applicant's holographically corrected microscope, as claimed.

No motivation is seen for destroying the function of the Schock cylinder by replacing it with a lens and making the other changes above, absent Applicant's disclosure. This appears to be a case of hindsight reconstruction that does not establish obviousness, In re Civitello, 144 USPQ 10.

Further, neither the telescope of Friedl nor the flow cylinder of Schock et al, suggests Applicant's claimed holographically corrected microscope. The Office Action has previously not given patentable weight to Applicant's novel microscope on the grounds that such limitation was in the preamble of his claims. However, such feature is now recited as a structural feature outside of the preamble, per the amended claims and is entitled to considerable patentable weight.

In addition to the structural distinctions noted, Applicant's claims include method claims e.g. 15, 18 and 32 and define a method for image correction in a microscope that is not suggested by either or both of the prior art references. The Office Action may state that the manner that a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from

the prior art but the same cannot be said of method claims, which clearly distinguish over the two references, as noted above.

Further, Applicant's apparatus claims are structurally distinct over the cited references, as discussed above.

Again there is no suggestion of combining the disparate references of Schock et al which discloses a photo reducer-like apparatus and of Friedl et al which discloses a telescope, which references direct laser beams in opposite directions and for different purposes, unless one has in view Applicant's own disclosure.

In contrast Applicant's invention makes possible various sized microscopes which can provide clearer images from flawed and low cost objectives, which microscopes are not suggested by the applied references.

As for Applicant's claims 21 et seq, these are directed to a holographic microscope which employs an array of pinholes, which array has not been seen in the prior art in correcting lenses and certainly not in a microscope, per Applicant's claims.

The Office Action would brush off this distinction by stating that array of pinholes is an obvious manner of design choice but cites not a single reference in holograph lens correction to support this generalization.

The Office Action further states that the specification fails to teach the criticality of having a pinhole array that would overcome any problem of using a singe pinhole plate. However, an example of such criticality is found in claim 36, where a reference beam is added to the reconstruction of a hologram (e.g., in Figure 15), that interferes with the hologram image so as to produce a fringed pattern thereon to permit extracting height information for a contour map of the object viewed. It happens that this contour map is only possible with an array of pinholes.

Also, the use of an array of pinholes to correct an objective in a microscope and to have a broad field of view is a structural feature of claims 21 et seq that is nowhere seen in the prior art. Thus, as the Office Action has not pointed out a reference that remotely suggests such claims, they are believed to have considerable novelty.

As to the Examiner's response to arguments, if the position of the Office Action is that since both references teach writing holograms for correcting aberrations of an optical system, no one else can obtain a patent in this area, no matter what holographic devices they invent, that would seem to be an overly sweeping view of the subject.

That is, a holographically corrected microscope has not been seen in the prior art even though the Friedl patent has been issued since at least 1971 and the Schock et al article was published in 1984. Yet despite the age of these references, the need for low cost microscopes (with high quality corrected lenses) was not met until Applicant's present invention, which would seem to negate the purported obvious combination of these two references.

As for the method of claim 36, it is believed highly novel in its use of two interference patterns, to provide a contour plot of an image. And no art has been cited which remotely suggests the novelty of this claim.

In view of the foregoing, the claims of record, as amended, are believed distinguished over the applied art and in condition for allowance. Early notice of allowance is requested.

In accordance with Section 714.01 of the M.P.E.P., the following information is presented in the event that a call may be deemed desirable by the Examiner: Thomas C. Stover, (781) 377-3779.

Respectfully submitted,

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Marked-up version of claims to show changes made to the above clean version.

1. (Thrice Amended) A holographic image corrector [for a microscope] comprising, a microscope which has,

a) an optical system having an objective,

b) at least one pinhole mounted before said objective,

c) means for recording the characteristics of said objective by sending a first [coherent] laser beam through said pinhole and through said objective or reflecting said beam therefrom to form an object beam,

d) means for intersecting said object beam with a reference [coherent] laser beam in a recording medium to form a hologram of said objective, said laser beams being coherent,

e) means to replace said pinhole with an article and

f) means to illuminate said article with [a coherent beam] a beam of the same wavelength as [one of the above coherent] said laser beams so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram and provides a corrected image of said article.

2. (Thrice Amended) A holographic image corrector [for a microscope] comprising, a microscope which has,

a) an optical system having an objective,

b) a pinhole mounted before said objective,

c) means for recording the characteristics of said objective by sending a first [coherent] laser beam through said pinhole and through said objective or reflecting said beam therefrom to form an object beam,

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d) means for intersecting said object beam with a reference coherent laser beam in a recording medium to form a hologram of said objective,

e) means to replace said pinhole with an article and

f) means to illuminate said article with a [coherent] beam of the same wavelength as [one of the above coherent] said laser beams so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram and provides a corrected image of said article.

Cancel claims 9, 10 & 11 and 27 & 28.

15. (Thrice Amended) A method for image correction in a microscope comprising,

a) recording the characteristics of an optical system having an objective, by sending a first [coherent] laser beam through a pinhole and through said objective or reflecting said first beam therefrom to form an object beam,

b) intersecting said object beam with a reference coherent laser beam in a recording medium to form an interference pattern or hologram thereof,

c) replacing said pinhole with an article and

d) illuminating said article with a [coherent] beam [that is,] of the same wavelength as [one of the above coherent] said laser beams so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram, to provide a corrected image of said article.

16. (Twice Amended) The method of claim 15 employing an objective [-lens system] at a working distance of at least 10 in. from said article [to serve as a long distance microscope].

18. (Thrice Amended) A method for image correction in a microscope comprising,

a) passing a [coherent] laser beam through a beam splitter to form separate coherent beams 1 & 2,

b) directing beam 1 through a first pinhole to illuminate an objective and define an object beam,

c) directing beam 2 through a second pinhole to a collimating lens to define a reference beam and then into interference with said object beam in a recording medium to define a hologram,

d) removing said first pinhole before said objective and replacing said pinhole with the article to be viewed and

e) illuminating said article by a [coherent] beam of the same wavelength as [one of the above] said coherent beams so that light therefrom passes through or reflects off said objective and through an imaging lens to diffract through or off said hologram to reconstruct the original reference beam but with article information retained, to correct for defects in said objective and to provide an accurate image in a recording medium or for viewing.

19. (Twice Amended) A corrective hologram maker [for a microscope] comprising,

a microscope which has

a) an optical system having an objective,

b) a pinhole mounted before said objective,

c) means for recording the characteristics of said objective by sending a first [coherent] laser beam through said pinhole and through said objective or reflecting said beam therefrom to form an object beam and

d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram thereof that can correct for defects in said objective.

21. (Thrice Amended) A holographic image corrector [for a microscope] comprising,

a microscope which has

a) an optical system having an objective

b) an array of pinholes mounted before said objective,

c) means for recording the characteristics of said objective by sending a first [coherent] laser beam through said array and through said objective or reflecting said beam therefrom to form an object beam and

d) means for intersecting said object beam with a reference coherent laser beam in a recording medium to form a hologram of said objective,

e) means to replace said array with an article and

f) means to illuminate said article with a [coherent] beam of the same wavelength as [one of the above coherent] said laser beams so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram and provides a corrected image of said article.

32. (Thrice Amended) A method for image correction in a microscope comprising,

a) recording the characteristics of an optical system having an objective, by sending a first [coherent] laser beam through an array of pinholes and through said objective or reflecting said first beam therefrom to form an object beam,

b) intersecting said object beam with a reference coherent laser beam in a recording medium to form an interference pattern or hologram thereof,

c) replacing said array with an article and

d) illuminating said article with a [coherent] beam of the same wavelength as [one of the above coherent] said laser beams so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram, to provide a corrected image of said article.

33. (Twice Amended) The method of claim 32 employing an objective [-lens] at a working distance of at least 10 in. from said article [to serve as a long distance microscope].

36. (Thrice Amended) The method of claim 32 wherein during step d) thereof, said reference beam is also directed at such hologram as before, to form an additional interference pattern of light and dark fringes superimposed on said image, to provide a contour plot thereof.

37. (Thrice Amended) A method for image correction in a microscope comprising,

a) passing a [coherent] laser beam through a beam splitter to form separate coherent beams 1 & 2,

b) directing beam 1 through a first array of pinholes to illuminate an objective and define an object beam,

c) directing beam 2 through a second array of pinholes to a collimating lens to define a reference beam and then into interference with said object beam in a recording medium to define a hologram,

d) removing said first array of pinholes and replacing said pinhole array with the article to be viewed and

e) illuminating said article by a [coherent] beam of the same wavelength as [one of the above coherent beams] said laser beam so that light therefrom passes through or reflects off said objective and through an imaging lens to diffract through or off said hologram to reconstruct the original reference beam but with article information retained, to correct for defects in said objective and to provide an accurate image in a recording medium or for viewing.

38. (Twice Amended) A holographic image corrector [for a microscope] comprising,

a) an optical system having an objective,

b) an array of pinholes mounted before said objective,

c) means for recording the characteristics of said objective by sending a first [coherent] laser beam though said array and through said objective or reflecting said beam therefrom to form an object beam and

d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram thereof that can correct for defects in said objective.

39. (Twice Amended) A method for objective correction [in a microscope] comprising,

a) recording the characteristics of an optical system having an objective by sending a first [coherent] <u>laser</u> beam through an array of pinholes and through [_] said objective or reflecting said first beam therefrom to form an object beam and

b) intersecting said object beam with a reference coherent beam in a recording medium to form an interference pattern or hologram thereof that can correct for defects in said objective.